

## Part 2: GBD – Understanding the Global Burden of Disease

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**Narrator:** In part one of this series, we talked about the Global Burden of Disease Study and how it is helping inform health organizations on the environmental exposures that most urgently need to be addressed to improve global health.

Joining us again is Dr. Howard Hu from the University of Washington School of Public Health. In our last segment, he explained that the Lancet Commission published findings from the Global Burden of Disease Study that environmental factors were responsible for 9 million premature deaths globally in 2015.

While the findings of the report are significant, Dr. Hu and his colleagues felt that a large part of the picture was still missing. That's why they started the Global Burden of Disease Pollution and Health Initiative to expand the number of environmental factors that are included in the GBD and how impacts on human health are addressed.

One example of this is how the GBD project accounts for the impacts of lead exposure.

**Hu:** The Global Burden of Disease study does include the impact of lead by calculating and using data to estimate lead exposure throughout the world and then estimating loss of IQ. And then it estimates the number of children who have IQs less than 85, which is the lower boundary that defines mild cognitive impairment, to estimate the overall impact on the Disability-Adjusted Life Year scale.

But one reason why the goal of this current initiative is to improve as well as expand the GBD's estimates of pollution is that, in fact, there's a lot of great research which shows that the impact on countries and economies is much more than simply what can be estimated from the number of children with IQs under 85. In fact, econometric research has shown that each point of IQ loss contributes towards an economic burden in terms of lost productivity and lifetime earnings.

So one of the things that we have been working on is trying to figure out how we can better capture the impact on the future of societies by diversifying the tools in the Global Burden of Disease-Pollution and Health Initiative for measuring those impacts so we can properly capture the impact of something like lead exposure. A way forward that currently looks promising is measuring the impact of lead (and other neurotoxicants) using a recently created measure of Human Capital.

**Narrator:** Another way Hu and his collaborators are working to improve the GBD through the Pollution and Health Initiative is by expanding the number of environmental factors that are considered when evaluating impacts on human health.

**Hu:** This risk profile is only counting indoor and outdoor air pollution, lead, radon and some occupational risks. Well, how about all the other chemicals and pollutants that are not included yet in the global burden of disease? Things like mercury, things like pesticides, and how about global climate change, which also has not been included in the global burden of disease?

And that's why we initiated the Pollution and Health Project, which is an effort to try to improve and expand the GBDs estimates on pollution so we can better understand what the total impact is.

**Narrator:** Some of the chemicals that Dr. Hu and his collaborators are working to add include mercury, arsenic, and manganese, which may harm neurodevelopment. Others, called persistent organic pollutants because they are not broken down in the environment, may interfere with the body's endocrine system, which produces important hormones that control different functions.

To better measure exposure to these pollutants and others, Hu and his collaborators are using new and innovative techniques, such as using silicone wristbands, which offer a low-cost way to capture and then measure personal exposure to thousands of pollutants.

**Hu:** Some of what we've been doing has been working with various exposure scientists to capitalize on new data sources that can help us even in areas where we don't have population-level sampling. So in particular, satellite remote sensing has now been used, which is data available throughout the world on smaller and smaller, finer scales, to estimate exposures that can be extrapolated from such data.

And then there's technologies that are being developed to connect to smartphones that will also enable us to do sampling, even in remote areas, of air, water and food, and these are the kinds of approaches that we hope that can be used to give us much better data on exposures worldwide.

**Narrator:** As the Pollution and Health Initiative works to prioritize environmental risk factors to be included in the GDB project, Dr. Hu explained that climate change is a unique case. He says that while most people understand risks related to increasing temperatures, sea level rise, and extreme weather events, there are many potential impacts we still don't understand.

**Hu:** There's still a lot to be learned and to be understood of the climate changes current and coming impacts on health. The World Health Organization has already estimated that there's probably about 100,000 excess deaths related to climate change already each year, mostly from the changing climate's impact on food availability, crop yields, and changing patterns of infectious disease. How about the future?

**Narrator:** Even as Dr. Hu and his collaborators continue to provide important data to inform health protective policies around the world, they continue to look to the future and explore new ways to help decision makers prioritize where to invest resources. For example, they are working on new approaches to forecast changes in environmental risk factors and predict where the worst disease burdens will occur.

To learn more about the Global Burden of Disease Project and the Pollution and health initiative, visit our website at [niehs.nih.gov/podcasts](https://niehs.nih.gov/podcasts).

Thanks to today's guest, Dr. Howard Hu, for joining us again.

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